

AN EVALUATION OF SOUTHERN APPALACHIAN WHITE PINE  
(*Pinus strobus* L.) ORIGINS IN SOUTHERN ILLINOIS

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Abstract: Half-sib progenies from 74 trees in 26 stands were evaluated at nine years of age from seed. Analysis of variance revealed highly significant differences between stands and families within stands for height, diameter, and foliage color. Families were chosen for sawlog/pulpwood and Christmas tree/ornamental categories by using selection intensity.

Key words: Origins, selection methods

The results of an earlier range-wide white pine provenance study in southern Illinois have shown that southern Appalachian origins are faster growing than more northerly origins. An extensive seed collection zone has been recommended. However, the desirable seed collection zone in the southern Appalachians needs to be more precisely defined (Funk, et al. 1975).

METHODS

The trees studied represent 74 collections of seed made in the states of: Georgia, Kentucky, North Carolina, Tennessee, Virginia, and West Virginia. There were 11 collections from single trees in stands. The other 63 represented collections from several trees in each of 15 stands. In all, 26 stands were represented. The trees were received as 1-0 seedlings from Michigan State University and grown for two years in the Union State Tree Nursery at Jonesboro, Illinois. The 1-2 transplants were outplanted on a site located 3 miles southwest of Carbondale, Illinois on the Southern Illinois University Farms. The field design is a randomized complete block with three replications and 4-tree linear plots. The site is in the Hosmer soil series which consists of gently sloping, moderately well-drained soils that are moderately deep to a fragipan. These soils formed in loess.

Total height, d.b.h., survival, Christmas tree grades, the trees never sheared (USDA 1957), and foliage color of all trees in each plot were measured after the 1975 growing season. Plot means were calculated for all data collected. Analysis of variance was used to test each set of plot means for significant differences among stands, among families, and among families within stands.

Families were selected for the following categories and characters:

1. Sawlog/Pulpwood: total height, diameter, and survival
2. Christmas trees/Ornamentals: Christmas tree grades, foliage color, and survival.

The families selected for each category were determined by taking the families in the top 20 percent of each character and then selecting those families which were common to all characters of a category.

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## RESULTS

### Height

Family means for total height at age 9 years from seed, six years in the field planting, ranged from 362 to 102 cm. The mean height was 230 cm. Analysis of variance revealed highly significant differences (1% level) between stands and between families within stands (Table 1). Families from Monroe and Polk Counties, Tennessee, and Fannin County, Georgia were notably taller than the plantation average (Table 2). The variation was primarily stand to stand, not between families within stands. The seven best families were all from stands in these three counties.

Table 1. Probability that variation was due to chance

Source of variation	Dependent variable				
	Height	Diameter	Survival	Christmas tree grade	Foliage color
Stand	.01	.01	.01	.01	.01
Family/Stand	.01	.01	.75	.05	.01

### Diameter

Family means for diameter ranged from 49 to 1 mm. The mean diameter was 23 mm. Highly significant differences (1% level) were found between stands and between families within stands (Table 1). Families from Monroe and Polk Counties, Tennessee, and Fannin County, Georgia had considerably greater diameters than the plantation average (Table 2).

### Survival

The range of family means for survival was 100 to 58 percent. The mean survival was 85 percent. Highly significant differences (1% level) were found between stands. Family within stand differences were non-significant. Survival was positively correlated with total height (0.05) and found to be highly significant (1% level). Families from Tennessee and Georgia had consistently high survival rates, most of these being 100 percent, rarely being below 95 percent.

### Christmas tree grades

Data was collected in early winter because it is at this time that Christmas tree characteristics are most important. Family means ranged from 3.6 to 1.0 on a 4 point scale. Highly significant differences (1% level) were found between stands. Significant differences (5% level) were found between families within stands (Table 1). Families from West Virginia had the highest grades, but families from Tennessee were well above the plantation mean of 2.3 (Table 2).

### Foliage color

Foliage color data was also collected in early winter. Family means ranged from 4.7 to 3.0 on a 5 point scale with 1 representing Yellow and 5 representing Dark Blue-Green. Analysis of variance revealed highly significant differences (1% level) between stands and between families within stands

Table 2. Families selected for sawlog/pulpwood and Christmas tree/ornamentals categories.

SAWLOG/PULPWOOD

MSFG -	State and county of origin	Height (cm)	% of plantation mean	Diameter (mm)	% of plantation mean	Survival (%)
3497	Tenn. Polk	321	139	45	196	100
3500	Tenn. Polk	362	157	49	213	100
3503	Tenn. Monroe	297	129	38	165	100
3504	Tenn. Monroe	349	151	49	213	100
3506	Tenn. Monroe	287	125	37	161	100
3515	Ga. Fannin	292	127	41	178	100
3517	Ga. Fannin	292	127	38	165	100

CHRISTMAS TREE/ORNAMENTAL

MSFG-	State and county of origin	Foliage color	% of plantation mean	Christmas tree grade	% of plantation mean	Survival (%)
3500	Tenn. Polk	4.7	120	3.1	156	100
3504	Tenn. Monroe	4.2	108	3.1	135	100
3506	Tenn. Monroe	4.2	108	3.0	130	100
3581	W. Va. Braxton	4.3	110	3.0	130	100

(Table 1). Families from Tennessee and Georgia exhibited the best foliage color, but families from West Virginia also exhibited good color (Table 2).

#### DISCUSSION

Families were selected for sawlog/pulpwood and Christmas tree/ornamental categories by using a 20 percent selection intensity for appropriate characters in each category. Seven families from stands in the three Georgia and Tennessee counties previously mentioned were selected for the sawlog/pulpwood category (Table 2). Four families were selected for the Christmas tree/ornamental category. Three families from Tennessee were in both categories. Two of the three families were from a stand in Polk County, Tennessee. The third family is from a stand in Monroe County, Tennessee. These families are recommended for intensified study and tentatively recommended for use in southern Illinois. Tests of southern Appalachian origins in lower Michigan have shown that the families from Polk and Monroe Counties performed well there also (Wright et al. 1976). Thus, these families should also be well-suited for use in central and possibly northern Illinois. Families from Polk County, Tennessee and Fannin County, Georgia also performed well when grown in Tennessee (Thor 1976).

#### CONCLUSIONS

This study has shown that it will be feasible to select superior origins of southern Appalachian white pine for reforestation or future breeding work in southern Illinois. More research needs to be done on the variation which exists in Georgia, North Carolina, and Tennessee. The families chosen for the two categories show that white pines can be selected which will be valuable for both sawlog/pulpwood products and Christmas tree/ornamental uses in southern Illinois. Thus, selected white pines could be grown for timber or pulp, with high-grade Christmas trees being removed in intermediate thinnings.

LITERATURE CITED

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